

**U.S. DEPARTMENT OF ENERGY
DEPARTMENT-WIDE
FUNCTIONAL AREA QUALIFICATION STANDARD**

FIRE PROTECTION QUALIFICATION STANDARD

Defense Nuclear Facilities Technical Personnel



**U.S. Department of Energy
Washington, D.C. 20585**

May 1995

Approval and Concurrence

The Assistant Secretary for Environment, Safety, and Health is the Management Sponsor for the Department-wide Environmental Restoration Functional Area Qualification Standard. The Management Sponsor is responsible for reviewing the Qualification Standard to ensure that the technical content is accurate and adequate for Department-wide application. The Management Sponsor, in coordination with the Human Resources organization, is also responsible for ensuring that the Qualification Standard is maintained current. Concurrence with this Qualification Standard by the Assistant Secretary for Environment, Safety, and Health is indicated by the signature below.

The Technical Personnel Program Coordinator (TPPC) is responsible for coordinating the consistent development and implementation of the Technical Qualification Program throughout the Department of Energy. Concurrence with this Qualification Standard by the Technical Personnel Program Coordinator is indicated by the signature below.

The Technical Excellence Executive Committee (TEEC) consists of senior Department of Energy Managers. This Committee is responsible for reviewing and approving the Qualification Standard for Department-wide application. Approval of this Qualification Standard by the Technical Excellence Executive Committee is indicated by the signature below.

NOTE: **The signatures below reflect concurrence and approval of this Qualification Standard for interim Implementation. Final concurrence and approval will occur in December 1995, pending comments received based upon implementation.**

CONCURRENCE:

Assistant Secretary for
Environment, Safety, and Health

Technical Personnel Program
Coordinator

APPROVAL:

Chairman
Technical Excellence Executive Committee

CONTENTS

PURPOSE	1
APPLICABILITY	1
IMPLEMENTATION REQUIREMENTS	1
DUTIES AND RESPONSIBILITIES	4
BACKGROUND AND EXPERIENCE	5
REQUIRED COMPETENCIES	5
1. GENERAL TECHNICAL	6
2. REGULATORY	7
3. ADMINISTRATIVE	10
4. MANAGEMENT, ASSESSMENT, AND OVERSIGHT	11
EVALUATION REQUIREMENTS	17
CONTINUING TRAINING AND PROFICIENCY REQUIREMENTS	17

**U.S. DEPARTMENT OF ENERGY
FUNCTIONAL AREA QUALIFICATION STANDARD**

FUNCTIONAL AREA

Fire Protection Engineer

PURPOSE

The Technical Qualification Program is divided into three levels of technical competence and qualification. The General Technical Base Qualification Standard establishes the base technical competence required of all Department of Energy defense nuclear facility technical personnel. The Functional Area Qualification Standards build on the requirements of the General Technical Base Qualification Standard and establish Department-wide functional competence requirements in each of the identified functional areas. Office/facility-specific qualification standards establish unique operational competency requirements at the Headquarters or Field element, site, or facility level.

The Fire Protection Engineering Functional Area Qualification Standard establishes common functional area competency requirements for all Department of Energy fire protection engineer technical personnel who provide management oversight or direction impacting the safe operation of defense nuclear facilities. Satisfactory and documented completion of the competency requirements contained in this Standard ensures that technical employees possess the minimum requisite competence to fulfill their functional area duties and responsibilities. Additionally, these competency requirements provide the functional foundation to assure successful completion of the appropriate Office/facility-specific qualification standard.

APPLICABILITY

This Standard applies to all Department of Energy Fire Protection Engineers technical personnel who provide management direction or oversight impacting the safe operation of defense nuclear facilities. Personnel designated by Headquarters or Field element line management as participants in the Technical Qualification Program are required to meet the requirements of this Standard as defined in Department of Energy (DOE) Order 3410.

IMPLEMENTATION REQUIREMENTS

The competencies contained in the Standard are divided into the following four categories:

1. General Technical
2. Regulatory
3. Administrative
4. Management, Assessment, and Oversight

Each of the categories is defined by one or more competency statements indicated by bold print. The competency statements define the expected knowledge and/or skill that an individual must possess, and are requirements. Each of the competency statements is further explained by a

listing of supporting knowledge and/or skill statements. The supporting knowledge and/or skill statements are not requirements and do not necessarily have to be fulfilled to meet the intent of the competency.

The competencies identify a familiarity level, working level, or expert level of knowledge; or they require the individual to demonstrate the ability to perform a task or activity. These levels are defined as follows:

Familiarity level is defined as basic knowledge of or exposure to the subject or process adequate to discuss the subject or process with individuals of greater knowledge.

Working level is defined as the knowledge required to monitor and assess operations/activities, to apply standards of acceptable performance, and to reference appropriate materials and/or expert advice as required to ensure the safety of Departmental activities.

Expert level is defined as a comprehensive, intensive knowledge of the subject or process sufficient to provide advice in the absence of procedural guidance.

Demonstrate the ability is defined as the actual performance of a task or activity in accordance with policy, procedures, guidelines, and/or accepted industry or Department practices.

Headquarters and Field elements shall establish a program and process to ensure that all defense nuclear facility technical personnel required to participate in the Technical Qualification Program meet the competency requirements contained in this Standard. Documentation of the completion of the requirements of this Standard shall be included in the employee's training and qualification record.

In select cases, it may be necessary to exempt an individual from completing one or more of the competencies in this Functional Area Qualification Standard. Exemptions from individual competencies shall be justified and documented in accordance with DOE Order 3410. Exemptions shall be requested by the individual's immediate supervisor, and approved one level above the individual's immediate supervisor.

Equivalencies may be granted for individual competencies based upon an objective evaluation of the employee's prior education, experience, and/or training. Documentation of equivalencies shall indicate how the competency requirements have been met. The supporting knowledge and/or skill statements may be considered when evaluating an individual's ability with respect to each competency requirement.

Training shall be provided to employees in the Technical Qualification Program who do not meet the competencies contained in the qualification standard. Departmental training will be based upon supporting knowledge and/or skill statements similar to the ones listed for each of the competency statements. Headquarters and Field elements should use the supporting knowledge and/or skill statements as a basis for evaluating the content of any training courses used to provide individuals with the requisite knowledge and/or skill required to meet the qualification standard competency statements.

DUTIES AND RESPONSIBILITIES

The following are duties and responsibilities normally expected of defense nuclear facility technical personnel assigned to the fire protection functional area:

- A. Serve as a subject matter expert in the area of fire protection.
- B. Review fire hazard analyses, assessment, and safety documentation for compliance with appropriate requirements.
- C. Evaluate the participation of fire emergency response organizations in emergency response exercises; monitor personnel training and qualification, and equipment readiness to respond to fires, accidents, medical emergencies, hazardous material incidents, rescue and other emergencies.
- D. Review adequacy of contractor fire protection programs to ensure compliance with applicable codes, standards, guides, regulations, Departmental Orders, and accepted practices.
- E. Participate in accident and incident investigations as required.
- F. Interpret fire protection requirements and make recommendations to Department management, facility representatives, contractor management, and line organizations.
- G. Represent the site/facility and/or the Department at fire protection meetings, professional conferences, and technical standards committees.
- H. Provide oversight of site fire protection programs and their implementation.
- I. Evaluate adequacy of facility design in accordance with fire protection criteria and recommend changes to facility design and/or fire protection criteria.
- J. Review and evaluate requests for exemptions and equivalencies.
- K. Participate in the development of contract requests, budget impacts, and planning for future fire protection activities.
- L. Maintain proficiency in fire protection engineering concepts and practices.
- M. Participate in special assignments and perform assessments related to fire protection.

Additional duties and responsibilities specific to the site, the facility, operational activities, and/or involved organizations shall be contained in the facility specific qualification standard(s).

BACKGROUND AND EXPERIENCE

The U. S. Office of Personnel Management's Qualification Standards Handbook establishes minimum education, training, experience, or other relevant requirements applicable to a particular occupational series/grade level, as well as alternatives to meeting specified requirements. The Fire Protection Engineer position is classified by the Office of Personnel Management as Occupational Series 804.

DOE Order 5480.7A requires that each Department Cognizant Secretarial Office and each Operations Office have available one or more "qualified Fire Protection Engineers" to accomplish the specific objectives outlined in the Order. A "qualified Fire Protection Engineer" is defined in the Order as follows:

Qualified Fire Protection Engineer A graduate of an accredited engineering curriculum and having completed not less than four years of engineering practice, three of which shall have been in responsible charge of diverse fire protection engineering work. If not such a graduate, a qualified engineer shall, either: demonstrate a knowledge of the principles of engineering and have completed not less than six years engineering practice, three of which shall have been in responsible charge of diverse fire protection engineering projects; be a registered professional engineer in fire protection; or meet the requirements for a Grade 11 or higher Fire Protection Engineer as defined by the Office of Personnel Management.

REQUIRED COMPETENCIES

The competencies contained in this Standard are distinct from those competencies contained in the General Technical Base Qualification Standard. All Fire Protection Engineers must complete the competency requirements of the General Technical Base Qualification Standard prior to, or in parallel with, the completion of the competency requirements contained in this Standard. Each of the competency statements defines the level of expected knowledge and or skill that an individual must possess to meet the intent of this Standard. The supporting knowledge and/or skill statements further describes the intent of the competency statements.

1. GENERAL TECHNICAL

See "Required Background".

2. REGULATORY

NOTE: 1: When Department of Energy (DOE) directives are referenced in the qualification standard, the most recent revision should be used.

2.1 Fire protection personnel shall demonstrate an expert level knowledge of Department of Energy (DOE) Order 5480.7A, Fire Protection.

Supporting Knowledge and/or Skills

- a. Describe the purpose and content of the Order.
- b. Explain the applicability of the Order.
- c. State the objectives of the Order.
- d. Identify the additional fire protection related codes, standards, and regulations which contain minimum mandatory fire protection implementation criteria for Department Fire Protection Programs.
- e. Define the following terms and identify when the use of each process is appropriate in accordance with the Order:
 - Equivalency
 - Exemption
- f. Identify the requirements for an individual to be considered a "Qualified Fire Protection Engineer".
- g. Explain the responsibilities of each of the following with respect to the implementation of the requirements of the Order:
 - Cognizant Secretarial Officers
 - Assistant Secretary for Environment, Safety, and Health
 - Director of Nuclear Safety
 - Assistant Secretary for Nuclear Energy
 - Director of Administration and Management
 - Heads of Field Organizations
 - Heads of Headquarters Elements
 - Contractor Organizations
- h. Identify the basic requirements which must be met by a Department of Energy Fire Protection Program as described in Section 9 of the Order.
- i. Describe the role of Department Fire protection personnel with respect to implementation of this Order.

2.2 Fire protection personnel shall demonstrate a familiarity of the fire protection related aspects of the following Department of Energy (DOE) Orders and Standards:

- **DOE Order 5480.4, Environmental Protection, Safety, and Health Protection Standards**
- **DOE 5482.1B, Environment, Safety, and Health Appraisal Program**
- **DOE Order 5484.1, Environmental Protection, Safety, and Health Protection Information Reporting Requirements**

Supporting Knowledge and/or Skills

- a. Describe the content, requirements, relationships, and importance of these Orders with respect to fire protection issues.
- b. Discuss the "minimum mandatory" requirements/criteria, if any, contained in these documents in accordance with Section 5 of DOE Order 5480.7A, Fire Protection.
- c. Discuss the Contractor's fire protection responsibilities associated with implementation of these Orders.
- d. Describe the role of Department fire protection personnel with respect to implementation of the fire protection related requirements of these Orders.

2.3 Fire protection personnel shall demonstrate familiarity with the requirements for design control processes identified in the Department of Energy (DOE) Order 6430.1A, General Design Criteria, related to fire protection systems and components.

Supporting Knowledge and/or Skills

- a. Describe the "key elements" of DOE Order 6430.1A, General Design Criteria.
- b. Discuss the application of these "key elements" to the design of fire protection systems.
- c. Describe the desired content of design records.
- d. Identify who may conduct fire protection system and/or component design verifications.
- e. Describe the acceptable methods of conducting design verifications.
- f. Describe the conditions to be considered when testing to verify or validate design features.

3. ADMINISTRATIVE

- 3.1 Fire protection personnel shall demonstrate a familiarity level knowledge of the requirements and methods to maintain communications with Headquarters, field elements, and other regulatory agencies.**

Supporting Knowledge and/or Skills

- a. Describe the Department's organization and discuss the Department's procedures for communicating between Headquarters and Field Elements.
- b. Describe the Department's procedures and policy for communicating with state and local organizations, the Occupational Safety and Health Administration (OSHA), and other regulatory agencies.

- 3.2 Fire protection personnel shall demonstrate a working level knowledge of the record-keeping and reporting requirements specified by industry standards and Department Orders.**

Supporting Knowledge and/or Skills

- a. Discuss the Department's record-keeping and reporting requirements for fire protection programs.
- b. Given a copy of the Annual Summary of Department of Energy Fire Protection Programs, discuss the contents and its application within the Department.
- c. Given a copy of the Fire Protection Resource Manual, discuss the contents and its application within the Department.

4. MANAGEMENT, ASSESSMENT, AND OVERSIGHT

NOTE: 1: When Department of Energy (DOE) directives are referenced in the qualification standard, the most recent revision should be used.

4.1 Fire protection personnel shall demonstrate a working level knowledge of assessment techniques such as the planning and use of observations, interviews, and document reviews to assess facility performance, report results of assessments, and follow up on actions taken as the result of assessments.

Supporting Knowledge and/or Skills

- a. Describe the role of fire protection personnel with respect to oversight of Government-Owned Contractor-Operated (GOCO) facilities.
- b. Describe the assessment requirements and limitations associated with the interface with contractor employees.
- c. Discuss the essential elements of a performance-based assessment including:
 - Investigation
 - Fact finding
 - Exit interview
 - Reporting
 - Follow-up
 - Closure
- d. Describe the following assessment methods and the advantages or limitations of each method:
 - Document review
 - Observation
 - Interview
- e. Describe the action to be taken if the contractor challenges the assessment findings and explain how such challenges can be avoided.

4.2 Fire protection personnel shall demonstrate the ability to conduct assessments, develop corrective actions and recommendations, communicate assessment results, and develop supporting reports.

Supporting Knowledge and/or Skills

- a. Conduct a compliance-based assessment and a performance-based assessment. Identify the differences in outcomes and the reasons for these differences.
- b. Write an assessment appraisal report.
- c. Based on an evaluation of contractor activities, develop corrective actions and recommendations and communicate these to contractor management.

- d. Participate in a formal meeting between Department of Energy management and senior contractor management to discuss results of a fire protection assessment.

4.3 Fire protection personnel shall demonstrate the ability to trend fire protection related information/data.

Supporting Knowledge and/or Skills

- a. Using the appropriate process, trend and analyze operations information and discuss its relationship to fire protection activities.
- b. Using an actual list of performance indicators, determine what type of assessment should be performed and in what areas.
- c. Identify and discuss typical performance indicators that are used to review fire protection activities.

4.4 Fire protection personnel shall demonstrate an expert level knowledge of the requirements and process for granting exemptions and equivalencies for fire protection activities.

Supporting Knowledge and/or Skills

- a. Given an exemption or equivalency request, review, evaluate, and make recommendations for granting such requests.
- b. Describe the factors that must be considered before granting exemptions and equivalencies.
- c. Describe the approval process for exemptions and equivalencies and the documentation requirements.

4.5 Fire protection personnel shall demonstrate an ability to apply fire safety evaluation criteria and methods to minimize the occurrence and extent of fires.

Supporting Knowledge and/or Skills

- a. Perform a facility assessment for fire safety that includes the following:
 - House-keeping
 - Configuration control
 - Fire loading
 - Hot work (including welding, torch use and open flame)
 - Smoking policy (cigarettes, etc.)
 - Impairment control
 - Hazard recognition
 - Work controls
- b. Discuss the importance of management commitment and the criteria used to evaluate this commitment to the following:

- Deficiency resolution
 - Self-assessment
 - Issues management
 - Conduct of Operations
 - Trending and Analysis
 - Preventive maintenance
 - Resource allocation (dollars, personnel, equipment)
- c. Review a quality assurance program related to the fire protection organization and activities. Analyze the program for the following:
- Independent verification
 - Control of transient combustibles
 - Personnel training
 - Documentation
 - Quality Assurance Implementation Plan

4.6 Fire protection personnel shall demonstrate a working level knowledge of emergency response operations including personnel training and qualification, equipment, and facilities.

Supporting Knowledge and/or Skills

- a. Discuss the relationships between, and importance of, the following as related to emergency response operations:
- Alarms and/or Monitoring
 - Central Alarm Station (design)
 - Dispatching
 - Communication equipment and methods
 - Interface with other organizations
- b. Discuss fire protection concerns associated with providing emergency response operation activities for the following:
- Confined space entry
 - Emergency medical response
 - Hazardous material
 - Fire fighting
 - Smoke removal
 - Occupant evacuation
 - Water removal
 - Run-Off Containment
 - Transportation accidents
 - Rescue
- c. Discuss the fire protection and emergency response concerns associated with the staffing and readiness of personnel including:
- Evaluation of staffing levels
 - Mutual Aid Response Agreements
 - Health and physical fitness

- Central alarm station staffing
- d. Explain the importance of emergency exercise evaluation and discuss the criteria used in conducting an evaluation of the following with respect to emergency response readiness:
 - Emergency drills
 - Equipment
 - Training
 - Qualifications
 - Safety documentation
 - Occupational safety and health

4.7 Fire protection personnel shall demonstrate the ability to assess emergency response operations including personnel training and qualification, equipment, and facilities.

Supporting Knowledge and/or Skills

- a. Evaluate an emergency plan and explain the importance of pre-planning activities and emergency plan implementation exercises and drills.
- b. Evaluate the emergency response operations equipment in accordance with procedure/code requirements.
- c. Assess response times for emergency personnel and equipment with respect to emergency response operations.
- d. Observe and evaluate emergency response equipment and facility maintenance.
- e. Observe and evaluate emergency response personnel training and drills.
- f. Observe and evaluate the emergency response operations associated with the following:
 - Fire emergency
 - Medical emergency
 - Hazardous material emergency
 - Standby for hazardous operation
 - Hazardous duty/activity standby.
- g. Evaluate the number and distribution of fire stations in accordance with the applicable standard/code.

4.8 Fire protection personnel shall demonstrate a familiarity level knowledge of contract management and administration sufficient to appraise contractor organizations in the area of fire protection.

Supporting Knowledge and/or Skills

- a. Discuss the key elements of the contractual relationship between the Department of Energy and the contractor, and the process for preparing cost estimates and budgets.
- b. Describe the role of fire protection personnel with respect to the evaluation of contractor fire protection programs for the cost-plus award fee process.
- c. Describe the responsibilities of fire protection personnel associated with contractor compliance with the Price-Anderson Act.
- d. Using actual or hypothetical data from a fire protection program, discuss the program's budget, schedule, and impact on the fire protection activities.

4.9 Fire protection personnel shall demonstrate the ability to evaluate fire protection training and qualification programs.

Supporting Knowledge and/or Skills

- a. Observe and evaluate two on-the-job training exercises for adequacy and adherence to appropriate local guidelines.
- b. Review a set of contractor fire protection personnel training records for accuracy and completeness.

4.10 Fire protection personnel shall demonstrate the ability to independently assess contractor and/or Federal employee compliance with the requirements contained in Department of Energy (DOE) Order 5480.7A, Fire Protection.

Supporting Knowledge and/or Skills

- a. Assess contractor and/or Department work activities associated with fire protection in accordance with the responsibilities and requirements contained in DOE Order 5480.7A.
- b. Given data from an assessment, analyze the results to determine compliance or noncompliance with the requirements.
- c. Given the results from an analysis of compliance or noncompliance, document the results and communicate the results to contractor and/or Department line management.

4.11 Fire protection personnel shall demonstrate the ability to independently assess contractor and/or Federal employee compliance with the requirements contained in the following Department of Energy (DOE) Orders with respect to fire protection issues:

- **DOE Order 5480.4, Environmental Protection, Safety, and Health Protection Standards**
- **DOE 5482.1B, Environment, Safety, and Health Appraisal Program**

Supporting Knowledge and/or Skills

- a. Assess contractor and/or Department work activities associated with fire protection in accordance with the responsibilities and requirements of the above Orders.
- b. Given data from an assessment, analyze the results to determine compliance or noncompliance with the requirements.
- c. Given the results from an analysis of compliance or noncompliance, document the results and communicate the results to contractor and/or Department line management.

EVALUATION REQUIREMENTS

The following requirements shall be met to complete the Fire Protection Engineer Qualification Standard. The evaluation process identified below serves as a measurement tool for assessing whether the participants have acquired the technical competencies outlined in this Standard.

1. Documented completion of the Department-wide General Technical Base Qualification Standard in accordance with the requirements contained in that standard.
2. Classification by the cognizant personnel management office as a Fire Protection Engineer. The Office of Personnel Management sanctioned equivalencies or alternatives may be applied.
2. Documented completion of the competencies listed in this functional area qualification standard. Documentation of the successful completion of these competencies may be satisfied by a qualifying official using any of the following methods:
 - Documented evaluation of equivalencies
 - Written examination
 - Oral evaluation
 - Observation of performance

CONTINUING TRAINING AND PROFICIENCY REQUIREMENTS

Fire Protection Engineers shall participate in an office/facility/position-specific continuing training and qualification program that includes the following elements:

1. Continuing technical education and/or training covering topics directly related to the duties and responsibilities of fire protection engineering as determined by appropriate management. This may include courses and/or training provided by:
 - Department of Energy
 - Other Government agencies
 - Outside vendors
 - Educational institutions
 - Professional conferences and meetings such as:
 - DOE Annual Fire Protection Conferences
 - NFPA Annual and/or Fall Meetings
 - ASTM E-5 Committee Meetings
 - NFPA Standards Committee Meetings
 - Factory Mutual
2. Training covering topics that address identified deficiencies in the knowledge and/or skills of the fire protection individual.
3. Training in areas added to the Fire Protection Functional Area Qualification Standard since initial qualification.

4. At a minimum, the continuing training and proficiency activities of fire protection personnel should include the following each year:
 - Site/facility/position-specific topics such as changes to the facility, significant facility events
 - Industry events (including both Department of Energy and applicable commercial events)
 - Lessons learned
5. Fire protection personnel must be actively engaged in responsible fire protection related activities each year to maintain their qualification.